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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/063,573      | 05/03/2002  | Ho-Ming Tong         | 8385-US-PA          | 9758             |

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JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE  
7 FLOOR-1, NO. 100  
ROOSEVELT ROAD, SECTION 2  
TAIPEI, 100  
TAIWAN

EXAMINER

EDMONDSON, LYNNE RENEE

ART UNIT

PAPER NUMBER

1725

DATE MAILED: 08/13/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/063,573

Applicant(s)

TONG ET AL.

Examiner

Lynne Edmondson

Art Unit

1725

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 May 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 28-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Fang (US 2003/0099767 A1).

Fang teaches a method of forming bumps on a silicon wafer wherein the active surface has a an under bump metallurgy (UBM), attaching a first solder block (212) to an upper surface of the UBM by bonding, planarizing (grinding) the first solder block (paragraph 14) and attaching a second solder block (264) to the upper surface of the first solder block by bonding. Bumps are planarized by polishing (grinding) which uses pressure (paragraphs 26-27). Bumps are bonded by reflow (paragraphs 30- 34). The solder blocks are made of Sn:Pb solders (paragraph 32). See also Fang claims 1-3, 6-9 and 12-15.

3. Claims 1, 2, 4, 6, 7, 10-16, 18-21, 24-29, 31, 32 and 34-40 are rejected under 35 U.S.C. 102(e) as being anticipated by Hikita et al. (USPN 6458609 B1).

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Hikita teaches a method of forming bumps on a silicon wafer having an active surface with a passivation layer (14d) and a plurality of bonding pads (14a), the method comprising the steps of forming an adhesion layer (14e) comprising Ti, Ti-W or Cr (col 7 lines 43-65), forming a barrier layer (14f) over the adhesion layer, forming a wettable layer (14g) comprising Au over the barrier layer (col 8 lines 13-30) and forming a photoresist (14h) over the wettable layer, removing the photoresist, attaching a plurality of first solder blocks (bumps or balls 16b) to the under bump metallurgy (col 9 line 40 – col 10 line 13) by reflow bonding (col 6 lines 1-24) or wire ball bumping (col 8 lines 31-39) and attaching a second plurality of solder blocks (col 5 lines 1-25) by bonding. The solder blocks comprise Au (col 5 lines 17-20). The wires are bonded using ultrasonic vibration and pressure (col 13 lines 9-37). Bumps are flattened (col 22 lines 23-25).

4. Claims 28 and 34-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Mis et al. (US 2003/0057559 A1).

Mis teaches a method of forming bumps on a silicon wafer wherein the active surface has a an under bump metallurgy (UBM), attaching a first solder block (35b,c on 31) to an upper surface of the UBM by bonding, attaching a second solder block (35 b,c on pad 43) to the upper surface of the first solder block by bonding (paragraph 32 and figure 2C. Bumps are bonded by reflow. The solder blocks are made of Sn:Pb solders (paragraph 27). See also Mis claims 1-34.

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***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-9, 14-23 and 29-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mis et al. (US 2003/0057559 A1) in view of Uzoh et al. (US 2003/0080431 A1).

Mis teaches a method of forming bumps on a silicon wafer having an active surface with a passivation layer and a plurality of bonding pads (paragraph 7), the method comprising the steps of forming an adhesion layer (27) comprising Ti or Ti-W (paragraph 20), forming a barrier layer (31) comprising Ni over the adhesion layer, forming a wettable layer (33) comprising Au or Cu over the barrier layer and forming a photoresist (29) over the wettable layer (paragraph 22), removing the photoresist (paragraph 23), attaching a plurality of first solder blocks (bumps) to the under bump metallurgy (34, paragraphs 26 and 27) by reflow bonding (paragraph 28) and attaching a second plurality of solder blocks (applied to pads 43) by bonding (paragraph 32). Although the bumps are shown as flat in figure 2C, there is no disclosure of planarizing the first solder bumps prior to attachment of the second solder bumps.

Uzoh teaches bonding of wafer bumps with UBM (paragraphs 4 and 26) wherein the bumps are planarized by polishing (paragraph 30) in a CMP process which uses pressure (paragraph 36).

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It would have been obvious to one of ordinary skill in the art at the time of the invention to planarize the bumps prior to attachment to facilitate alignment (Mis, paragraph 32) and allow reliable bonding of solder structures on both substrates in a single reflow operation (Mis, paragraphs 6 and 35).

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tsuboi (USPN 6528881 B1), Andricacos et al. (USPN 6224690 B1), Tsai (USPN 6300250 B1), Chakravorty (USPN 6350668 B1), Lee (US 2003/0089758 A1) and Weng (US 2003/0129821 A1).

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne Edmondson whose telephone number is (703) 306-5699. The examiner can normally be reached on Monday through Thursday from 6:30 a.m. to 5 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (703) 308-3318. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-7718 for regular communications and (703) 305-7115 for After Final communications.



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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.

Lynne Edmondson  
Examiner  
Art Unit 1725



8/5/03

LRE  
August 5, 2003